Reconstruction of Machined Surfaces by Contact Welding and Milling of Worn Parts

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ABSTRACT

Information is provided on the mechanical processing methods used in the preparation or finishing of worn surfaces in mechanical engineering, as well as in the restoration of parts to size or with the installation of additional elements. When the welded surfaces are made by contact welding, sizing and milling, the geometric shape of the working surfaces is restored, and when installing additional elements, its size is adjusted to the size of the new part.

Keywords: contact welding, finger milling, worn surfaces, detail restoration.

Introduction

This article provides information on the machining methods used in the preparation or finishing of worn parts for coating surfaces, as well as in the restoration of parts to size or with the installation of additional elements. When the welded surfaces are made by contact welding, sizing and milling, the geometric shape of the working surfaces is restored, and when installing additional elements, its size is adjusted to the size of the new part.

Welding methods are one of the most important methods of repairing machine parts. Currently, more than 70% of parts are being restored by repair and welding methods at repair shops. Of this, 80% is done using electricity and 20% with the help of a gas flame

Welding is used to eliminate mechanical defects of parts, and liquid coating is used to restore worn work surfaces with a layer of metal. Repair companies use manual and mechanized welding and liquefied coating methods. A number of mechanized methods are used, such as automatic and semi-automatic, oscillating arc laser and plasma welding, under the flux layer and in the environment of shielding gases.

Contact welding is a form of pressure welding that includes the use of liquid tape and liquid coating of steel tape, wire and metal powder. This method is used only for welding metals, and the main source of energy is the heat released as a result of the passage of an electric current through the contact surface of the connecting parts.

In contact welding, compressive strength is applied to form a stable electrical contact and to improve the weld structure, as well as to reduce deformation and internal stress.

In contact welding, the process can be carried out in two different ways: 1) by heating the metal to a high plastic state without liquefaction; 2) by heating the metal at the welding point until it is liquefied, forming a cast structure. Both processes are used in production. However, liquefied welding is more efficient from an energy and technological point of view. Because it consumes less electricity and the weld is stronger. This method can be used to restore worn surfaces of steel, cast iron and non-ferrous metal parts and body parts with bearings. The method has drawbacks such as the complexity of the equipment, as well as the limited thickness of the weld seam that can be removed.

The essence of the method of metal spray restoration of worn parts is that the coating material is heated to a prefabricated surface of the part, as well as sprayed with a stream of compressed gas. The sprayed metal deforms when it hits the surface of the part, filling the surface pores and irregularities to form a coating. The metal particles adhere to the surface of the part and to each other mainly mechanically. Only at certain points are they welded.

In electromechanical processing, the redistribution of the surface metal occurs due to the insertion of a current-carrying device into the part. The expansion of the shaft diameter after straightening of the spiral lines shall not exceed 0.4 mm. Due to the thermal effects, the shaft neck heals. The fatigue resistance of the part increases by 10 ... 12%. It is recommended to fill the ditches with various materials, such as wire welding.

Today, the joint venture UZ SUNGWOO in Fergana region has launched the production of car parts by stamping. In the UZ SUNGWOO joint venture, after 15-20 thousand technological processes in the production of automotive parts, the matrix and punch are worn out, cracks are formed, which leads to defects in the manufactured parts. The angle of inclination of the milling tooth screw groove affects the value of the cutting force along the axis, the direction of the cutting edge, the values of the anterior, organic angles and other parameters of milling.

Fig 1. Contact welding process.

The repair shops also carry out the process of restoring worn parts and increasing their wear resistance. The required accuracy can be achieved by contact welding and milling of stamping machines to repair die and punch parts.

It is accepted to divide all available welding methods into two main groups - liquid welding methods and pressure welding methods. Liquid welding is very important in repair, so it is well studied.

Contact welded surfaces can be resized to size by milling. Among other measures to reduce surface roughness in finger milling is achieved by special sharpening of the milling cutter, which "strokes" some of the teeth. However, in contrast to sharp-edged milling cutters, finger-shaped milling cutters have a very high distribution of the values of the height of the microns. This can be thought of as a change in the angular values of the body at different points in the trajectory of the milling cutter tooth. In the area of the tooth coming out of the metal (cut), the angle of the organ has a negative value, which can lead to plastic deformation and abrasion of the surface layer.

Fig 2. Restoring the contact welded matrix part to the size of the milling cutter.

The strength factor in the processing of metals, the relationship between the components of the shear force, their value and direction often determine the nature of the distribution of technological residual stresses in the outer layers. Based on the analysis of the directions of equal shear forces, the difference in the sign and intensity of the residual stresses in the direction and direction of milling and directional milling is shown.

The cutting speed determines the intensity and strength of the plastic deformation of the metal, the duration of contact between the cutting tool and the part, the amount of load and friction coefficient on the surface of the tool, the temperature in the cutting zone and the formation of the metal surface layer.

When milling hard-working materials 14x17N2, 12x18N9, 12x18N10T, 08x18N10T, an increase in the density of the surface layer was observed with increasing cutting speed. When studying the milling of 14x17N2 alloy, it is shown that the density of the surface layer has a variable dependence on the cutting speed. When processing hard alloys, an increase in cutting speed indicates a decrease in the depth and degree of compaction of the surface layer.

Cutting speed of finger-milling of hard-to-work materials from 17 to 40 m / min. The shear stresses on the surface decrease from 40 kg / mm^2 to 0. voltage reaches + 40kgs / mm^2.

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